Modeling Vertically-Staged Earthwork
Variable-Depth Removal of Expansive Clay (Cont.)

Volume Report
Subgrade vs Stripped

Balance Analysis Volumes (BCY)

	Total	Cut	Area Fill	OnGrade	Volume Cut	Volume Fill	Comp/Ratio Cut	Comp/Ratio Fill	Compact Cut	Compact Fill	Export -Import	Change Per 0.1 ft
Landscape	**31,296**	**17,796**	**13,499**	**1**	**30**	**395**	**1.00**	**1.15**	**30**	**454**	**-424**	
Clay	16,951	580					1.00		580		580	
Silty Sand	950	10					1.00		10		10	
		Landscape Total:			**620**	**395**			**620**	**454**	**166**	**133**
Roadway	**14,371**	**14,371**	**0**	**0**	**55**	**0**	**1.00**	**1.15**	**55**	**0**	**55**	
Clay	14,371	1,170					1.00		1,170		1,170	
Silty Sand	5,601	220					1.00		220		220	
		Roadway Total:			**1,445**	**0**			**1,445**	**0**	**1,445**	**61**
Slab Sub:	**34,317**	**19,458**	**14,859**	**0**	**29**	**720**			**29**	**827**	**-798**	
Clay	19,069	738							738		738	
Silty Sand	1,538	36							36		36	
		Total Slab:			**803**	**720**			**803**	**827**	**-24**	**145**
Walk Sub:	**2,218**	**2,207**	**10**	**1**	**7**	**0**			**7**	**0**	**7**	
Clay	2,090	82							82		82	
Silty Sand	193	2							2		2	
		Total Walk:			**91**	**0**			**91**	**0**	**91**	**10**
Regions Total	**82,202**	**53,832**	**28,368**	**2**	**121**	**1,115**			**121**	**1,281**	**-1,160**	**349**
Clay	52,481	2,570							2,570		2,570	
Silty Sand	8,282	268							268		268	
		Regions Total:			**2,959** *(BCY)*	**1,115** *(CCY)*			**2,959**	**1,281**	**1,678**	**349**

Stripping Qtys	Plane Area	Slope Area	Depth	Volume
Remove Sub:	316	319	0.333	4
Strip Sub:	81,886	81,883	0.500	1,516
Stripping Total	**82,202**	**82,202**		**1,520**

Subgrade vs. Stripped Plan Volumes:
2,959 BCY Cut; 1,281 BCY Fill; 1,678 BCY Net Long (after stripping and 15% cut-to-fill shrinkage applied); plus 1,516 BCY Stripped Topsoil.

Evaluation: Considering the three ***Balance Region*** removal reports (page 180) and the job's ***Subgrade vs. Stripped Report Regions*** initial takeoff report (above), the job's starting plan earthwork included 1,516 BCY of topsoil stripping, 2,959 BCY of cut-to-subgrade, and 1,281 BCY of fill-to-subgrade (all from the ***Report Regions*** report above). The clay removal requires 412 BCY of additional cut (**Clay Removal** vs. **Stripped** volume on first ***Balance Region*** report) and 472 BCY replace-to-subgrade of additional fill (the net volume from the second and third ***Balance Region*** reports). The job's overall total cut has increased to 3,371 BCY (2,959 BCY + 412 BCY = 3,371 BCY) and total fill has increased to 1,753 BCY (1,281 BCY + 472 BCY = 1,753 BCY). The job's net long volume has nominally decreased to 1,618 BCY (3,371 BCY Cut - 1,753 BCY Fill = 1,618 BCY Export), not counting the net export volumes of any ***Stripping Qtys*** on the above report (removal off-haul and net of the stripped and re-spread topsoil volumes).

Notes: Some users looking for **a shortcut** to the above method might make a copy of the job file (use *Save As*) then add 3.0' to the building's *Sectional Area* thickness, recalculate the *Report Regions* volumes (with *Subgrade vs. Stripped*) and note the resulting increase in the clay strata cut volume at the building's Report Region; however, that shortcut would not include the additional horizontal clay removal beyond the building line and it may include some clay cut above the building's subgrade (the double-counted volume problem), so some manual adjustments to the calculated clay volume would still be required. Also, the "**Subtraction Method**" manipulations (in the previous rock undercut example on page 158) could be adapted to the above clay removal. And AGTEK 4D's **Apply Template utility** provides other options for modeling building undercuts as documented in AGTEK's videos at ***www.agtek.com/video.html?id=228*** and ***www.agtek.com/video.html?id=482***. There are many ways to model and quantify a removal in AGTEK.